September 23, 1998

Ms. Char Hauger
U.S. Army Corps of Engineers
190 E. Fifth Street East
St. Paul, MN 55101

RE: Golder Associates Paste Technology Report for the Nicolet Minerals Co.; 94-01298-IP-DLB

Dear Ms. Hauger:

I wish to thank you for inviting the U.S. EPA to attend the presentation by Golder Associates in your offices on Thursday, September 24, in St. Paul. From what I understand, this presentation is being given to enable Golder Associates and Nicolet Minerals Company to present a relatively new technology involving both mine backfill and tailings disposal to the Corps of Engineers. As I spoke to you on the phone earlier this week, I will not be attending the presentation, but below are a list of comments/concerns that I have after reviewing both (different drafts of the same document?) the August 1998 Report on Surface Disposal Options using Paste at the Crandon (received from Ben Wopat on 9/14/98) and the Report on Surface Deposition Options Using Depyritized Paste Tailings for the Crandon Project, dated September 1998 and received from Nicolet Mineral Co. on September 12, 1998).

One general concern that I have is that, as mentioned in one of the articles attached to the Ben Wopat letter, dated September 10, 1998, is that "Because paste production technology is a relative newcomer, there are few case histories which can be used as the basis for an accurate full-scale assessment of capital and operating costs" (Section 4.0 of the Paste Disposal-The Future of Tailings Management Practice? by D. Landriault, etal.) Is this also true of case histories on short-term and long-term performance? All nine paste technology support articles supplied by Golder and attached to the 9/10/98 Wopat letter, were written/co-authored either by D. Landriault, President of Golder Paste Technology Ltd., and/or P. Newman, Vice-President of Golder Paste Technology Ltd. Are there other reviews available from parties other than Golder-related personnel? Are there any drawbacks to using paste technology over other methods? Are there other new and comparable technologies available that are used by other companies but not mentioned in these articles?

Other comments on the two reports are as follows:

8/1998 Report:
Comment #1: Section 2.0, page 2: What was the size of the small sample referenced in this report? Is it large enough to represent the entire anticipated depyritized tailings waste stream? Are there any limitations to the results being based on a small sample vs. if a larger sample were available (i.e., on page 8 in Section 4.1 it mentions how since only a limited sample was available for material characterization testing, slump values had to be estimated)?

Comment #2: Section 4.1, page 8: In the second paragraph, it states, "The material can be transported as a paste and, at the higher slumps preferred for surface disposal, (easier to transport through a pipeline) there should not be any major problems." What major or minor problems are possible? Since a limited sample and estimated slump values were used, the potential problems should be discussed.

Comment #3: Section 4.1, page 8: The end of this section states, "High placement densities can likely be achieved, reducing the footprint of the tailings area." Will the TMA configuration be changed if paste technology is used? Will the use of paste technology mean less of a footprint for the TMA, but since the paste processing building(s) will need to be located near the TMA (Section 5.1.1), will more or less of a TMA-related footprint be required?

Comment #4: Section 4.2, page 8, 4th bullet: Will the addition of portland cement replace the need to add lime as an acid buffer? Should it be necessary to add lime to the above-ground tailings, what product would be used, and how would it be integrated into the paste technology? How will the addition of lime effect the characteristics of the paste? Where is the likely source of lime products? (These two reports seem to indicate that since the tailings are "de-pyritized", that they are no longer considered to be acid producing. Has this been determined?)

Comment #5: Section 4.2, page 9, 5th bullet: If the tailings are placed in thin layers on the surface in paste form, will the tailings be drying in these layers or will it eventually dry/solidify as one, large unit. My concern is that if the tailings are placed in thin layers and dry as such, then these feathered layers may crack with weight of the TMA vehicles or just by settlement, and produce conduits and holding areas for excess water.

Comment #6: Section 5.2, page 12: Will the TMA Feasibility Report be revised to include the alternate uses of the TMA as described in this section? (Section 5.0 of the 9/98 Report highlights some of the amendments that will be needed to the TMA but does not discuss the alternate uses of the TMA cells, only the physical changes needed to address paste vs. slurry.)

Comment #7: Section 5.2, page 12: This section discusses some of the seasonal issues such as effects of temperature on the paste distribution throughout the TMA. It mentions that precautions will be taken to address the harsh climatic conditions expected during winter operations, such as buried pipelines, but it does not discuss what happens to the paste during the freezing months. How does the paste react to freezing, i.e., does it retain its water, freeze, get covered by new paste, only to thaw out later and release its water content within the TMA?

9/1998 Report:

Comment #8: Section 1.0, page 1: As mentioned in Comment #4 above, this section states in the 1st paragraph that, “Removal of the pyrite from the tailings will result in a non-acid generating tailings being deposited in the tailings management area (TMA).” Has NMC officially stated that they will be removing the pyrite from the tailings or is this still in the “economic study” stage? I was under the impression that even with the removal of pyrite, that the tailings would still be acid producing, even with a pyrite concentration of less than 1%. We should not assume that the threat of acid mine drainage has been removed just because the majority of the pyrite has been removed.

Comment #9: Section 2.1, page 3: This section describes how more ore can be recovered due to increased production and due to the new backfill procedures. Since more ore can be recovered (“The increased strength of the backfill enables larger fill exposures when recovering secondary stopes”) does this also mean that more waste rock will be produced? If so, will there be a revised estimate on the amount of waste rock produced? Will the additional waste rock be enough to off-set the decrease in the size of the TMA footprint that is one of the benefits of paste technology?

Comment #10: Section 2.3, page 5: The 3rd paragraph states that one of the benefits of paste technology is that the backfilling cycle time can be increased, therefore increasing production. How does this relate to the overall expected life of the project? Will the use of paste technology, due to the shorter time needed to backfill the stopes and the shorter time needed to reclaim the TMA, shorten the 28 year operation time and 4 year reclaimation estimates?

Comment #11: Section 2.4, page 7: The 5th advantage listed, “Potential to amend the tailings in the future if desired to improve its geotechnical or geochemical properties to further enhance the environmental performance.” needs more explanation.

Comment #12: Section 3.1 and 3.1.1, page 8: How much acreage will the new surface paste plant and the large agitated storage tank require? Will this area be outside the current TMA footprint or be incorporated within? Section 3.1.1 states that, “... it is proposed that the surface paste plant be constructed adjacent to the TMA in order to reduce the capital cost required for the paste pumps.” Will a plant also be needed near the mine shaft so that the paste can be close to the backfill destinations?

Comment #13: Section 3.2.1, page 12: This section refers to Figure 2, stating that it illustrates one filling sequence that will be considered. Does this figure represent a reconfiguration of the entire TMA or is it showing only the breakdown of previous TMA Cell 1?

Again, thanks for the opportunity to provide you with these comments prior to your meeting with

Golder Paste Technology Ltd. and NMC on September 25th in your offices in St. Paul. More comments may be forthcoming, as I have given the paste reports to others within USEPA for review. If you have any questions regarding any of the above comments, please contact me at 312-886-7252.

Sincerely,

Daniel J. Cozza, Project Manager
United States Environmental Protection Agency

cc:
H. Nelson, BIA
C. Hansen, FCP
A. McCammon Soltis, GLIFWC
J. Coleman, GLIFWC
P. Thibodeau, H&W
D. Cox, MIT
P. Seem, MIT
G. Reid, NMC
D. Anderson, Mole Lake
G. Bunker, SBM
J. Trick, USFWS
J. Krohelski, USGS
B. Tans, WDNR
R. Berg, B&A